



3.3 Tanya Atwater

Tanya Atwater is a professor of Earth Science at the University of California, Santa Barbara. She has studied sea floor spreading and propagating rifts. She is currently researching the plate tectonic history of western North America. One of her main goals as a geologist is to educate people about our Earth.

Artist and adventurer



While growing up, Tanya Atwater wanted to be an artist. She loved figuring out how to record on paper the things she could see in three dimensions.

Atwater and her family went on many vacations, where, she says, “I always hogged the maps, taking great pleasure in translating

between the paper map and the passing countryside.” Whether it was camping, hiking, or river rafting, all of the trips had one thing in common—adventure. As a result, Atwater developed a deep love for the outdoors.

Geology in the mountains and at sea

Atwater started her college career at the Massachusetts Institute of Technology (MIT). She tried a variety of majors, including physics, chemistry, and engineering. Atwater then attended the Indiana University geology summer field camp in Montana. There, she learned about geological mapping and how land structures translate into lines and symbols. Atwater was hooked on geology!

Atwater transferred to the University of California at Berkley. She had already completed many math and physics courses at MIT, so she decided to major in geophysics.

After graduation, Atwater held an internship at Woods Hole Oceanographic Institute in Massachusetts. There, she combined the adventures of ocean sailing with geophysics.

A close look in a tiny submarine

In 1967, Atwater began graduate school at the Scripps Oceanographic Institution in La Jolla, California. During this time, many exciting geological discoveries were being made. The concept of sea floor spreading was emerging, leading to the current theory of plate tectonics.

While at Scripps, Atwater joined a research group that used sophisticated equipment on ships to study the sea floor near California.

Part of Atwater’s later research on sea floor spreading involved twelve trips down to the ocean floor in the tiny submarine Alvin. Only Atwater and two other people could fit in it. Using mechanical arms, they collected samples on the ocean floor nearly two miles underwater! Atwater’s firsthand view through Alvin’s portholes gave her a better understanding of the pictures and sonar records she had studied.

She was also amazed to see hot springs gushing out of the ocean floor near volcanoes. She adds, “A whole bunch of brand new kinds of animals were living there. We saw giant white tubes with bright red worms living in them, giant clams, octopuses, crabs, giant anemones, and lots of slimy things. Weird!”

Propagating rifts

In the 1980s, Atwater was part of a team that researched propagating rifts near the Galapagos Islands off the coast of Ecuador. Propagating rifts are created when sea floor spreading centers realign themselves in response to changes in plate motion or uneven magma supplies.

Atwater also discovered many propagating rifts on the sea floor in the northeast Pacific Ocean and in ancient sea floor records worldwide.

An Earth educator

Atwater has been a professor at the University of California, Santa Barbara for over 25 years. She has received many awards for her work in geophysics. She currently studies the plate tectonic history of western North America. This includes how the San Andreas Fault and Rocky Mountains were formed.

Atwater also works with media, museums, and teachers and she creates educational animations to educate people about Earth. She explains, “My job as a geoscience educator is to help as many students as possible to know and understand and respect our planet—to help them really care about it and act on their caring.”



Reading reflection

1. How did Atwater's family contribute to her passion for planet Earth?
2. Why was it an exciting time to study geology while Atwater was in graduate school?
3. Describe how Atwater has gotten close-up views of the ocean floor.
4. What are propagating rifts and where has Atwater observed them?
5. How does Atwater educate people about Earth?
6. **Research:** The Woods Hole Oceanographic Institution—Marine Operations has used the submarine Alvin for many research endeavors for over 40 years. Describe some of Alvin's noteworthy trips.